

Dr. Page's Report to the Local Government Board on Diphtheria Prevalence in Berwick-upon-Tweed Urban Sanitary District.

GEORGE BUCHANAN,
Medical Department,
December 8th, 1888.

THIS inquiry was ordered by the Board in view of large mortality in Berwick from diphtheria recorded in recent Returns of the Registrar-General. Ten diphtheria deaths were recorded in the first quarter of this year, and four in the quarter ended June 30.

Berwick-upon-Tweed Urban Sanitary District comprises the parish of Berwick and the townships of Tweedmouth and Spital. It has an area of 8,766 acres, with a population in 1881 of 13,998, occupying 2,371 inhabited houses. In 1871, the population was 13,282. The town proper embraces the parish of Berwick, and stands upon the north side of the river Tweed, upon ground rising from 13 feet above ordnance datum at the bridge end, to 125 feet at the railway station. The soil is chiefly clay, overlying red sandstone. Almost three-fourths of the whole population reside in the town. The townships of Tweedmouth and Spital lie upon the south side of the river, the former immediately across Berwick Bridge to the south-west, and the latter due south and upon the neck of sand between the estuary of the Tweed and Berwick Bay. Tweedmouth, population 2,885, lies between levels of 10 feet along the river to 64 feet above ordnance datum in the highest parts, upon clay overlying red sandstone rock, which is here full of springs. Spital has a population of about 1,900, increased during summer by visitors, who come for the sea-bathing. It is upon sand and gravel, at low levels ranging from 12 to 30 feet above ordnance datum.

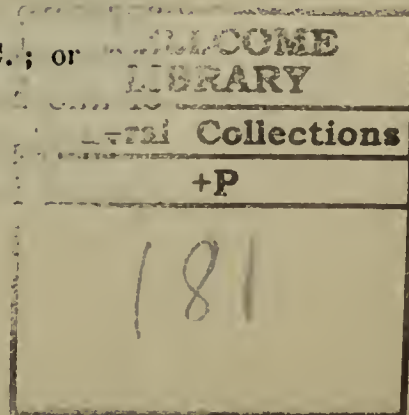
Each of these communities has its own public elementary schools, attended, it may be said, exclusively by the children of the locality in which they are placed.

At the outset of my inquiry, I had interviews with every medical practitioner in the place, from whose concurrent testimony I learned that there had been no sudden outbreak of diphtheria, limited in place or time during the present year, with which these deaths had been associated, but that the disease had been lingering in the district for the last few years, manifesting its existence by scattered cases and mortality in one or another of the three localities alluded to. The following table, which I have compiled from the death registers since 1878, shows that diphtheria and other fatal throat illnesses have, indeed, figured habitually in the death returns for a very

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considerable period. In this connexion it deserves notice that "croup," formerly as abundant as diphtheria, has, since 1886, almost disappeared from the death register; the diminution in the total fatality from throat illness having since then been more than replaced by deaths from "diphtheria."

TABLE showing the Number of DEATHS recorded from DIPHTHERIA and CROUP (non-spasmodic) in the Parish of BERWICK and Townships of TWEEDMOUTH and SPITAL in each Year from 1878 to 30th June 1888.

Locality.	1878.		1879.		1880.		1881.		1882.		1883.		1884.		1885.		1886.		1887.		1888 to June 30.	
	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.	Diphtheria.	Croup.
Berwick, population 9,213.	3	3	2	3	1	1	0	2	0	3	2	0	5	3	1	2	4	0	1	0	5	0
Tweedmouth, population 2,885.	2	1	0	1	0	0	0	0	1	1	0	2	0	0	4	0	0	2	3	0	8	1
Spital, population 1,900	1	1	2	0	0	1	0	0	0	1	0	0	0	3	1	0	0	1	6	1	1	0
Total - -	6	5	4	4	1	2	0	2	1	5	2	2	5	6	6	2	4	3	10	1	14	1

With such a history of endemic diphtheria, it was hopeless to inquire into the origin of the disease, and the chief object of my investigation has been to discover, if possible, the main influences which have been concerned in its persistence and spread, with marked preference, so far as shown by the mortality, for one and another of the three sections of the sanitary district. For this purpose, I sought to learn the amount of sickness from diphtheria and allied ailments which had been noted in the medical practice of the district since the beginning of 1887, to the date of my visit, July 17th, 1888. This was most readily given to me, to the extent of the information at their disposal, by the whole of the medical practitioners, and altogether I received lists of 44 households which had been attacked with diphtheria or similar throat illness during the 18 months preceding my visit. But unfortunately, while I heard in addition of more or less prevalence of "sorethroat" and "mumps" during the earlier months of the present year, ailments for which diphtheria in its slighter manifestations is shown, by experience, to be somewhat commonly mistaken, such cases as had come under medical treatment had not been completely recorded, and in the sequel, I was unable to acquire anything more definite from other sources of information. Thus, one medical practitioner told me that although no true diphtheria had come under his care, several cases of "sorethroat like mumps, but with aphthæ on the tonsils," had, but he was unable to furnish the dates or whereabouts of the families affected. So far as I could procure, from medical evidence, a history of the course of infectious disease over the period in question, it would appear that there was diphtheria in the spring of 1887, followed by an epidemic of measles in summer and autumn, in the latter of which diphtheria again made its appearance, concurrent at first with scarlatina, and continued prevalent as diphtheria until May of this year, when it ceased, and was superseded by the scarlatina of mild type which had been concurrent with it. No notable association of these two diseases, in families, had been observed.

In the hope of learning something as to the prevalence and locality of the minor sorethroat referred to among school children, the school attendance lists were examined, but without result; references to scarlatina, mumps, and sorethroat as causes of absence were, indeed, met with, but were admittedly incomplete, and no special incidence of any of these was apparent upon one or another of the elementary schools of the district.

In regard to the earlier attacks of true diphtheria during the present year, special inquiry was made as to the incidence of the disease upon school-



going children. The schools of the district were closed from December 23rd, 1887, to January 9th, 1888, and their re-opening was followed by a number of attacks of distinct diphtheria, especially in Tweedmouth. But no marked incidence upon school-going children was discovered. Of two families attacked in Berwick during January, in one, mother and child fell ill together about January 1st, and in the other a child of four years sickened and died on the 26th of the month, 10 days after coming to reside in Berwick. In Tweedmouth, where four families were invaded during January, the earliest cases were of children in two families not attending school. In February eight households in Tweedmouth were invaded, in seven of which the first cases were of children not attending school. In the families in Spital attacked during January alone, the first cases were each of children attending school, one going to the British and the other to the National School. So far as I could learn, therefore, school attendance has, on this occasion, played no conspicuous part, so far as distinct diphtheria is concerned, in disseminating the disease, and, as already stated, evidence of prevalent sorethroat or similar illness was too fragmentary and vague to be of service in this aspect of the inquiry.

The schools were closed for the summer holidays at the time of my visit, but with the exception of a recent diphtheritic sorethroat in an adult belonging to a family attacked last April, diphtheria had disappeared since the beginning of June, some six weeks previously. The schools re-opened on August 20th, and I learn that up to the present time (November 21) no further cases of diphtheria have been heard of, and only a few cases of mild scarlatina.

The medical officer of health had diligently visited households invaded by actual diphtheria, of which he had information either from the death returns or his own poor law and medical practice, and had directed precautions in regard to the withdrawal of children from school and the fumigation and cleaning of infected rooms. But inquiry had not extended beyond these cases of actual diphtheria; absence of evidence of the propagation of this disease by recognised personal intercourse had not suggested that the connecting links might be found in prevalent sorethroat, or similar illness; and local insanitary circumstances had been regarded in each instance as altogether sufficient to account for the cases. I made detailed investigation into the circumstances of the 44 households attacked by diphtheria, or similar throat illness, extending my inquiry in the case of yards in tenemented property, also to neighbouring families. In all, the affected households included 235 persons—89 adults, and 146 children. Of this number 45—7 adults and 38 children—had been attacked since the beginning of 1887, and there had been 25 deaths, of which 10 had occurred last year, and the remaining 15 during the present year up to May 27, when the last fatal case was recorded. The whole of these deaths were certified as diphtheria, and all were of children, the majority at singularly early ages. Thus, of the 10 deaths recorded last year, 7 were of infants from 4 to 17 months old, 1 was a child of 3 years, and 2 were of children of 4 years of age; while of the 15 deaths during the present year, 5 were of infants under 18 months, 8 were from 2 to 4 years, 1 was a child aged 5, and 1 a girl of 11 years of age. Multiple cases occurred in three families only, namely, two each in two families and three in another. This excessive incidence of fatal “diphtheria” in infants is very unusual. How far it has been due to disappearance of the term “croup” from the death register, and how far to peculiarities of recent Berwick diphtheria, I am unable to say. Only once before have I met with similar excessive mortality of infants from throat disease, uniformly registered as diphtheria, namely, in 1887, at Workington, in Cumberland: and the repetition of such experience, in the north of England, is therefore noteworthy.

Of the 44 invaded households, 13 were in Berwick, 11 in Spital, and 20 in Tweedmouth; the incidence in proportion to population being almost identical upon the two latter townships, in which it was fivefold that upon Berwick. The dates, where ascertained, of invasion of households in each

sub-division of the district from January 1, 1887, to July 17, 1888, are given below in tabular form :—

		Berwick.	Tweedmouth.	Spital
1887.				
January	- -	28th	—	—
February	- -	- -	- -	2nd, 26th
March	- -	- -	18th	8th
April	- -	—	—	—
May	- -	—	—	—
June	- -	—	—	—
July	- -	—	—	—
August	- -	- -	- -	1st
September	- -	- -	- -	18th
October	- -	12th	—	—
November	- -	?	1st	?
December	- -	? ?	1st, 25th	—
1888.				
January	- -	4th, 12th	7th, ? ? ?	? ?
February	- -	?	7th, 8th, 9th, ? ? ? ? 22nd	? 15th
March	- -	14th, 20th	? 10th	—
April	- -	?	19th	End of.
May	- -	19th, 25th	19th	—
June	- -	—	—	—
July	- -	—	—	—

The households attacked belonged almost wholly to the labouring classes ; only two or three tradesmen's families were attacked, and one medical practitioner caught diphtheria while attending upon a patient suffering from it. There was an absence of paralytic symptoms following illness in all the more recent cases, and I could hear of one instance only, mentioned to me by Dr. Maclagan, senior, during the previous year.

The milk supply did not appear to be implicated ; it was derived in each of the three localities from a number of independent sources, besides which several of the first cases in invaded families were of infants at the breast.

Personal intercourse between healthy and infected families was not admitted in any instance, but in Tweedmouth, more especially, the relations of several of the latter appeared to me to be such as to readily allow of unrecognised intercourse of this kind taking place.

Instances of families attacked :—

Berwick.

1. R.—High Street. Family of four children. Mother and child of four years attacked January 1st, 1888. Other children had sorethroats later.
2. W.—Chapel Street. Family of five children. Infant, a year old, ill in April 1888. Had the breast only. Other children at school. No sore throats or other illness.

Tweedmouth.

1. G., Brewery Bank. Family of three children, not at school. Infant 10 months old attacked on January 3rd, 1888, died January 9th. Second child aged 5 years, began January 9th, died January 13th. A third and only remaining child, who had been residing in Edinburgh with her grandfather for three or four months previously to February 17th, was there attacked by diphtheria on that date, and died after three days' illness. I was told that the grandfather had come to both funerals at Tweedmouth, but with these exceptions, there had been no communication by clothes or the like, directly or indirectly, with the child in Edinburgh subsequently to the attacks of the other children. Cases of sore-throat were alleged to have existed in the immediate neighbourhood at Tweedmouth about the time of these illnesses. [I found a history of one family in which three cases of this sort had occurred, but the dates of attack were given as a week subsequent to those of the first cases of diphtheria.]

2. F., 182, Main Street. Man, wife, and three children in single-roomed tenement ; child aged 3, not at school, died of diphtheria Feb. 3, 1888 ; was subject to croup it is said. Others at school had no sorethroats. House damp.

3. G., Well Square. Family of six children. Child of 3 years, not at school, attacked with diphtheria Feb. 26th, 1888 ; recovered after performance of tracheotomy. Five other children not ill.

4. I., Well Square. Family of three children. Child of 2 years, not at school, attacked in February 1888, followed by illness of mother. Other children at school, not ill.

5. D., Garnick's Row. Man, wife, and four children inhabiting a single-room tenement; boy of 4 years, not at school, died 16th March 1888. Two other children at British school not attacked. In one of the other 16 tenements in this insanitary court, a child of 3 years had been attacked, and had died of diphtheria in March 1887.

Spital.

1. H., Town Road. Husband, wife, and three children occupying a single room. Child of 2 years, not at school, attacked in January 1888, and died 30th. A child of 11 months died of "inflammation of the lungs" three weeks later, and a third child of 7 years, going to school, was not ill. House damp, and one of a row of dwellings unprovided with eavespouting.

2. R., Main Street. Husband, wife, and eight children; one of latter only, an infant of 14 months, at the breast; attacked and died March 1st, 1887. Other children escaped illness. Gutters and privies close to rear of house.

3. P., Middle Street. Family of three children. Infant of 21 months, and altogether at the breast, ill of diphtheria, and died March 12th, 1887. Other two children not at school.

4. H., Main Street. In family of eight children, two aged 5 and 11 respectively, attacked in April 1888. Others escaped. Mother attacked with ulcerated throat July 10. Infection in the earlier cases believed to have been contracted from a case of sorethroat in a companion.

Upon a balance of considerations it has appeared to me that whatever has been the influence of personal infection in dissemination of diphtheria in Berwick, all the phenomena of prevalence of the disease there are not to be easily explained on a single hypothesis of communication of infection from person to person. Especially does such hypothesis fail to satisfactorily account for a number of attacks of infants who, in their turn, appear to have done little, if anything, in the way of propagating the disease. Locally a belief has existed that insanitary circumstances have had much to do, if not with causation of the diphtheria, at least with its intensification and fatality; but owing to shortcomings of the evidence already referred to, I am not in a position to affirm or to deny the validity of such belief. It is certain, however, that unwholesome conditions are unduly abundant in Berwick, and not least so in the quarters of the town chiefly affected by the diphtheria:—So I pass now to an account of the sanitary wants of the place.

The district was inspected by me in 1885 in connexion with the Cholera Survey then in progress, the sanitary circumstances and administration of the borough and port being the subject of special report and of recommendations. The sewerage of Berwick proper was completed in 1855, and consists of brick culverts of 2 feet diameter for the larger trunks, and for the rest of glazed earthenware pipes from 18 inches to 9 inches diameter, by which the older rubble drains have been, it is said, everywhere replaced. The outfalls run into the tidal estuary of the Tweed. Castle Terrace, a residential neighbourhood of some 40 houses, was sewered in 1881, by a separate system, discharging into the river by the Old Castle, and provided with automatic flushing tanks, and means of ventilation by surface gratings at every 120 yards. With this exception, the town sewers are unventilated, save at infrequent intervals by house rain-water pipes. The majority of house rain-water pipes are, however, cut off, and discharge upon the street. The smaller houses and tenemented property have commonly no indoor drain-inlets, and slops are got rid of down trapped gullies in the yards, whereas better-class houses, from their imperfect drainage arrangements, run considerable risk of receiving air from the public sewers.

Tweedmouth is not sewered save in one locality, where about a score of houses drain into the Commissioners drain, a culvert so called from the circumstance of its construction by the Harbour Commissioners in 1872. The outfall of this drain is into the harbour above low-water mark. It is ventilated by two 10-inch shafts. A few private house drains also discharge into the harbour, and the open gutters or channels into which the slops of the rest of Tweedmouth are thrown find their way at several points down to the river side.

Spital is drained by open gutters traversing the streets from one end to the other, but a few houses upon the beach get rid of slops and refuse water into cesspools sunk in the sand.

From rough construction, affording ready lodgment for their contents, the open channels in Tweedmouth and Spital are a source of habitual and persistent offensiveness.

In Berwick, waterclosets have nearly altogether replaced the old midden privies, not more than a dozen of which, I am told, are left. Waterclosets

Excrement disposal and removal.

in the smaller houses and tenemented property are out of doors. In the better houses, the soil-pipes of the in-door closets are imperfectly or not at all ventilated, save in those houses which have been built in quite recent years, where the soil-pipe has been carried up above the eaves in its full diameter. Attention has been given to the provision of separate flushing cisterns for the closets in every instance. In Tweedmouth and Spital midden privies are the rule, but during the present year the Sanitary Authority has adopted the pail or ash-closet system in the case of all new houses or alterations of old property. I am told there are somewhere about 40 such closets in Tweedmouth and 50 in Spital. The Authority undertakes the systematic scavenging of the whole district. There is a daily collection of ashes and house refuse, and privies as well as pails are emptied once a week. Large accumulation of excremental filth is thus prevented, and the sole obtrusive nuisance in connexion with excrement disposal arises from the insufficient closet accommodation not infrequently met with in tenemented property. One glaring instance of the kind noted in my survey report, two years ago, was in Garnick's Row, Tweedmouth, where one privy served for 16 families. This state of things I found still continuing and contributing, with the other unwholesome conditions already mentioned, to the foulness of this yard in which fatal outbreaks of diphtheria had occurred.

Water
supply.

Berwick, north of the river, is supplied from waterworks belonging to the Sanitary Authority. The supply is derived, partly by pumping from springs issuing from the sandstone rock at Tweedmouth, partly from a spring above the town, known as "Nine Well Eyes," and is distributed on constant service. It is stated to be of good quality and moderate hardness. The lower part of Tweedmouth is supplied from works belonging to a private company; the upper part having, from inadequacy of this supply, to depend upon three public wells which for many houses are of inconvenient access. Spital is similarly dependent upon a private and separate water service. In neither case are the owners of these respective waterworks empowered by Act of Parliament, or otherwise, to supply those places, and owing to the inadequacy of their supplies, the Sanitary Authority have had under consideration, during the present year, the question of introducing a proper public service, and correspondence with the Board upon the subject has recently taken place.

Dwelling-
houses.

As one might expect to find, Berwick presents in a marked degree the characteristic features of an old fortified town, in which, for centuries, building has been confined within the walls. Inside the "Ramparts" still girding the town, numerous courts and yards branch off from the wider thoroughfares, intersecting more or less depth of property at the rear. This is notably to be seen in Mary Gate, the main street of the borough, extending from the Town Hall to the Scotch Gate, and in Walkergate, which joins it about this point. Many of these yards are badly paved with cobbled stones, and have uneven gutters favouring nuisance from lodgment of dirty water, or imperfect scavenging. Examples of this sort were met with also in Hatter Lane off Walkergate, and in Chapel Street. These conditions contrast unfavourably with the well-scavenged roadways and improvements of the streets carried out by the Authority in some of these last-named localities since my previous visit. In the yards situated in the same localities tenemented property is the rule, leading to inevitable overcrowding where, as I frequently enough encountered, a whole family is living in every room. There is less density of building on the other side of the river, in Tweedmouth or Spital, but the amount of sub-let tenements, especially in the former, appears to be quite as prevalent.

Dampness of foundations and walls, arising largely from want of eave-spouting, was met with both in Tweedmouth and Spital; and in Tweedmouth this condition appeared to be aggravated in some instances by the natural wetness of the soil and absence of drainage.

Lodging-
houses.

The common lodging-houses, eight in number, are duly inspected and registered. They are, on the whole, cleanly and orderly kept, and a cubic allowance of 300 feet per head is required by the sanitary officers.

Slaughter-
houses.

Some 16 slaughter-houses are under license and inspection. Many compare favourably with the corporation shambles, which at the time of my visit were in a very filthy condition.

The regulation of dairies, cowsheds, and milkshops is carried out effectively, **Dairies.** and marked improvements have been made in the provision for the safe and wholesome storage of milk in particular instances, which I had noticed in my former inspection.

The Authority have two hospitals; a wooden one-storeyed cottage, on the Etal Road, with three small wards, available for the accommodation of altogether four patients, and the Port Sanitary Hospital, also a wooden structure erected in 1872 without the "Ramparts," on a sandy elevation overlooking the North Sea, and within 400 yards of the beach. It has two good wards capable of accommodating altogether eight patients.*

A portable steam disinfecting chamber is in use. It was designed by Mr. McGregor, the Borough Surveyor; in it a temperature of 240° F. can be attained, and it is large enough to hold a mattress and bedding. **Disinfection.**

Dr. Heagerty is Medical Officer of Health at a salary of 60*l.* a year. The Inspector of Nuisances, Mr. John Cruden, an able and energetic officer, receives 80*l.* as inspector of nuisances and 20*l.* as inspector of dairies, cowsheds, and milk shops. **Sanitary administration.**

Before leaving Berwick, I had an interview, at a meeting specially convened, with the Works Committee and the Tweedmouth and Spital Committees of the Sanitary Authority, when I brought under their notice need for action in various directions as follows:—

1. Provision for the free ventilation of the entire sewer system of Berwick. Before deciding as to the means by which this may be most efficiently carried out, the Sanitary Authority would do well to seek skilled advice.

2. Schemes for the proper sewerage and sewage disposal of the townships of Tweedmouth and Spital.

3. The question of water-supply of these townships should receive the further consideration of the Authority, with a view to speedy action.

4. House yards and courts which are unpaved or badly paved, leading to nuisance by reason of unevenness of the surface and lodgment of slops and dirt, should be flagged or concreted and properly channelled. Instances of localities where these defective conditions prevail are given in the body of the report. Garnick's Row, off Main Street, Tweedmouth, and Black Bull Yard, off the High Street, Berwick, are additional examples of similar nuisances.

5. Provision of eave-spouting in all dwelling-houses throughout the district, and especially in the townships of Tweedmouth and Spital.

6. Requirement, in accordance with section 36 of the Public Health Act, 1875, of adequate privy or closet accommodation. This is especially necessary in Garnick's Row, Tweedmouth.

7. The proper ventilation of tenemented dwelling-houses. With a view to prevent overcrowding and other conditions injurious to health, the Authority should consider the desirability of registering such premises under byelaws in accordance with section 90 of the Public Health Act. (See also section 8, Housing of the Working Classes Act, 1885.)

In conclusion, I have to acknowledge the cordial assistance given to me in the course of my inquiry by the whole of the members of the medical profession of the district, and by the borough surveyor and sanitary inspector, Messrs. MacGregor and Cruden.

DAVID PAGE.

November 21, 1888.

* No use has been made of the hospital accommodation during the recent diphtheria prevalence owing to, I am told, the disinclination of the people to avail themselves of the provision.

